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ROTARY ACTUATOR

TYPES

RM 12 TO

RM 21

Dear Customer,

Congratulations on choosing a SCHUNK product. By choosing SCHUNK, you have opted for the highest precision, top quality and best service.

You are going to increase the process reliability of your production and achieve best machining results – to the customer's complete satisfaction.

SCHUNK products are inspiring.
Our detailed assembly and operation manual will support you.

Do you have further questions? You may contact us at any time – even after purchase. You can reach us directly at the mentioned addresses in the last chapter of these instructions.

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1 Safety

1.1 Symbol key

You will find this symbol wherever **hazards for persons** or **damage to the product**

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are possible.

This symbol indicates **important information** on the product or its handling.

1.2 Appropriate Use

The rotary actuators are manufactured in accordance with the current level of technology and with recognised safety regulations. During their use, however, there may occur risks to life and limb of the user or impairment of the rotary actuator and other material assets.

The rotary actuators are intended exclusively for the swivelling movement of service loads in any position that do not react in their manipulation with any risk to persons, property or the environment.

The maximum permissible service loads and forces are given in our standard catalogue.
Any usage beyond these definitions is inappropriate.
The manufacturer cannot be held liable for loss or damage arising therefrom. The risk is borne exclusively by the user.

Usage in accordance with directions includes observation of the user manual as well as adherence to the maintenance and repair specifications prescribed by the manufacturer.
The rotary actuator must only be operated by persons that are familiar therewith and that have been instructed in the associated hazards. The relevant accident prevention regulations and the other generally recognised safety and occupational health regulations must be complied with.

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1.3 Safety Notes

1. **Responsibility for the compatibility of pneumatic equipment lies with the person who designs the pneumatic system or takes the decision on its specifications.**
   - Since the products specified herein can be used under various operating conditions, their compatibility with the appropriate pneumatic system must be based on specifications and/or tests in order to conform to their requirements.

2. **Machines and equipment operated by pneumatic means may only be used by trained personnel.**

   - Compressed air can be hazardous if an operator is not familiar with its use. The assembly, handling or repair of pneumatic systems is to be undertaken by trained and experienced personnel.

3. **Do not carry out maintenance work on machines and equipment and do not attempt to remove components until it has been confirmed that it is safe to do so.**
   - Inspection and maintenance of machines and equipment may only be carried out after it has been confirmed that the devices that must be switched off are in a securely deactivated condition.

   - If machine parts must be removed, carry out safety precautions as mentioned above. Deactivate the compressed air supply to this machine and release any remaining compressed air from the system.
   - Before machines and equipment are switched on again, take measures to ensure that cylinder rods etc. are not pushed outwards. Allow compressed air to enter the system slowly so that counterpressure builds up gradually.

4. **Contact SCHUNK (see chapter 12 page 14) if the product is to be used under one of the following conditions:**
   - Conditions and environments that lie outside the stated specifications, or where the product is to be used outdoors.
   - Installation in equipment in conjunction with nuclear power, railways, aerospace, vehicles, medical equipment, food and drink, leisure equipment, emergency shutdown circuits, applications in presses or safety equipment.
   - Any application that may possibly have negative influences on persons, animals or property and that requires a special safety analysis.

5. **This user manual should always be easily accessible**

1.4 Indications to the operating manual

This user manual describes gripper actuators of series RM 12, RM 15 and RM 21.
All statements in this user manual refer to the types stated above.

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2 Warranty

The warranty period is 24 months or 40 million load cycles after delivery date from the factory, assuming use in single-shift operation and that the recommended maintenance and lubrication intervals are respected. Components that come into contact with workpieces, wearing parts, shock absorbers, stop screws and proximity switches are never included in the warranty.
The warranty covers the replacement or repair of defective parts in the manufacturing plant. Further claims are hereby excluded. In this context, please also see our General Terms and Conditions.

3 Scope of Delivery

The scope of delivery comprises:

- Rotary actuator type RM, depending on the version ordered

4 Technical Data

Please consult our catalogue for further technical details. The last version is valid in each case. (in accordance with Chapter 2.3 General Terms and Conditions)

The airborne sound emitted from the unit is <= 70dB(A)

5 Operating and environmental conditions

- Do not use the product in environments comprising corrosive gases, salt water, water or vapours.
- For use in an atmosphere where water drops, oil, sprays etc, occur take appropriate countermeasures in order to ensure protection.
- If electronic end switches are to be used, these should not be used in the presence of strong magnetic fields. Please contact SCHUNK (see chapter 12 page 14) if the product is to be used in the presence of strong magnetic fields.
- Do not use the rotary actuator in an atmosphere in which it could come into contact with fluids such as oil or water.
- Do not use the rotary actuator in an atmosphere in which it could come into direct contact with substances such as powder dust, dust, sprays etc.
- Do not use the rotary actuator in an atmosphere in which sources of heat are present.
- Do not subject the rotary actuator to excessive vibrations and/or shocks.

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6 Assembly and Installation

6.1 Design precautions

- A protective guard is recommended in order to minimise the risk of injury.
- Ensure that loose, fixed and/or connected parts or tightened securely.
- Operation without the shock absorbers included as standard in the scope of delivery is not permissible.
- Take account of the possibility that the operating pressure may decrease as a result of power failures etc.
- Pay attention to the possibility of the failure of power supplies.
- Mount the compressed air supply in such a way as to prevent a gripping action.
- Pay attention to emergency shutdown facilities.
- Pay attention to what will happen after an emergency stop or abnormal stoppage. Ensure that nobody can be placed at risk or be injured when equipment is restarted.

6.2 Compressed air supply

- Use clean compressed air and insert a filter between the supply and the pneumatic system.
- Install a water separator in the pneumatic system.
- Use the product only within the range specified for the medium temperature and ambient temperature.

Air specification

- dry (free from condensation)
- filtered to 10 microns
- oiled or oil-free

6.3 Special connecting measures

- Use connecting pipes of a cross-section that is larger than or identical to that of the connector thread.
- Blow air through the connecting pipes before fitting the devices in order to remove any dust, contaminant or particles.
- Avoid the ingress of sealing material into the pipe network.
- Do not remove pneumatic components from their packaging until shortly before fitting.

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6.4 Assembly measures

- During the mounting of loads, do not allow the system to be subjected to impermissible forces or moments.
- The flatness of the mounting surfaces must be less than 0.02mm.
- Select the correct means of connection with a load that has its own guidance mechanism and ensure that this is adequately aligned.
- Avoid contact with the rotary actuator during operation.
- Select a suitable screw tightening torque for mounting of the rotary actuator or loads on the rotary actuator in accordance with the generally valid guidelines for screw connections.

6.5 Measures for the initial operation

Please read this user manual carefully. Knowledge of this user manual is essential in order to prevent errors and ensure problem-free operation.

Under no circumstances may rotary actuators be operated with oiled air if they are subsequently to be operated with oil-free air.

- Check the technical specifications.
- Do not use the device until you have checked that it functions correctly taking account of all permissible operating parameters.
- Regulate the operating speed of the cylinder by means of throttle type non-return valves. Increase from the low speed to higher speeds until the required operating speed is reached.

Selection and dimensioning

- Do not subject the units to loads that exceed the limits of their operating range. If excessive loads are applied , the gripper jaw guidance system and closing mechanism could suffer damage or inaccuracies. The maximum permissible loads are given in our standard catalogue.
- Do not allow the system to experience impermissible forces or shocks.

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7 Handling

7.1 Fine adjustment of rotation angle

For fine adjustment of the rotation angle and matching of the end damping to the mass moment of inertia occurring in operation, the following parts are included in the scope of delivery of each rotary actuator.

- Stop collar (Pos. 10)
- Locknut (Pos. 11)
- Locknut (Pos. 12)
- Shock absorber (Pos. 18)

Once the locknut (Pos. 11) has been loosened, the rotation angle can be steplessly adjusted between 0 and 180 degrees by turning the stop collar (Pos. 10) with the integral shock absorber (Pos. 18). Each end position can be adjusted by 90 degrees.

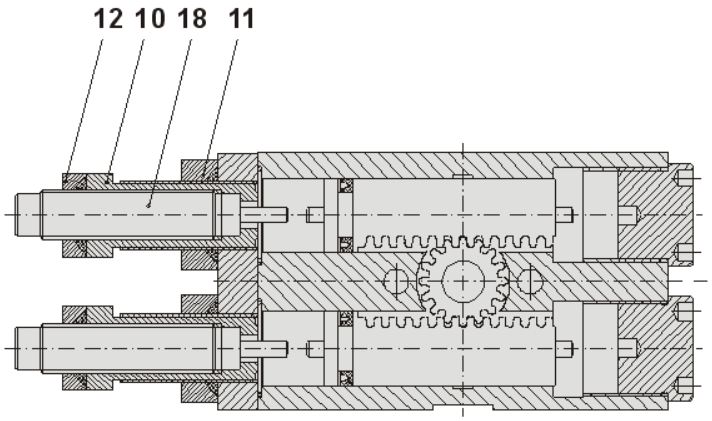

Figure 1: Fine adjustment of rotation angle

7.2 Damping adjustment

⚠ Operation without the shock absorbers included as standard in the scope of delivery is not permissible.
Please note the maximum permissible mass moment of inertia stated in our standard catalogue.

After the locknut (Pos. 12) has been loosened, the stroke length of the shock absorber and thus the damping curve can be matched to the mass moment of inertia occurring in operation by rotating the shock absorber (Pos. 18) inwards or outwards. This does not affect the rotation angle set previously.

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7.3 End position interrogation

Standardised interrogation sets for direct mounting are available for interrogation of end positions.

Proximity switch - complete **RMNS-...**

The scope of delivery includes:

- 1x retaining plate
- 2x switching cam
- 2x proximity switch
- 2x connection cable

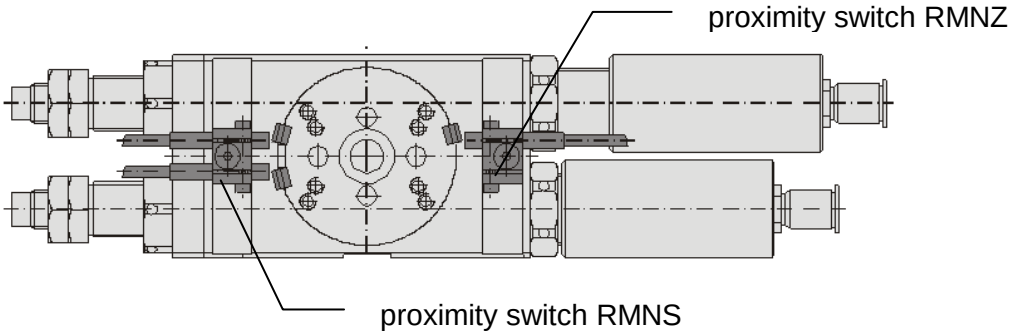

Figure 2: position of proximity switch

After the clamping screw has been loosened, the switching cam can be steplessly adjusted in a vee-shaped slot in the turntable. The specific end position interrogation can thus be precisely adjusted for each rotation angle set.

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7.4 Intermediate stops RZ

7.4.1 Setting of intermediate position

Intermediate stops are additional modules for rotary actuators and are available for all rotary actuator sizes of this series.

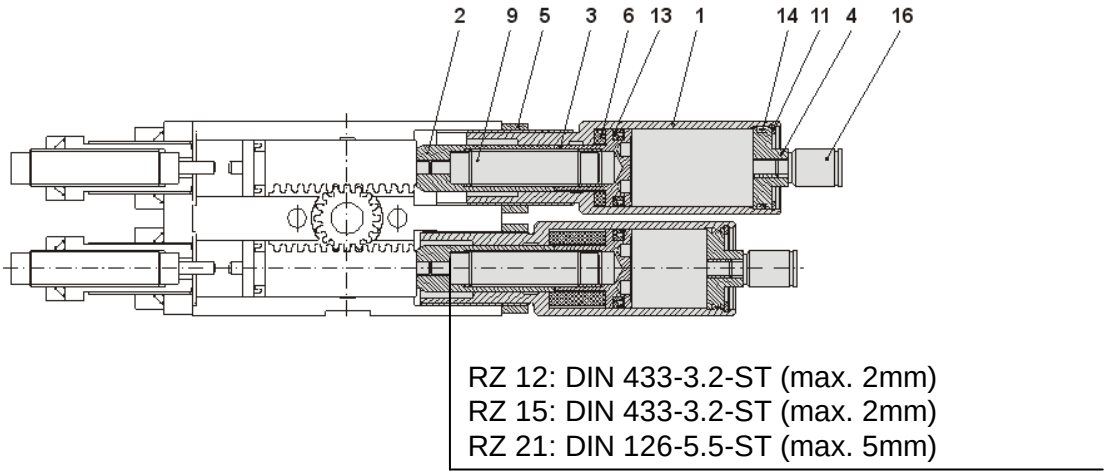

Figure 3: Rotary actuator shown in intermediate position at 90°

The intermediate position can be set at any point over the entire swivel range of the rotary actuator. It must be noted that the toothed racks of rotary actuators are tensioned without backlash where a controlled intermediate stop is used. For an intermediate position of 90 degrees or more, the stop cylinders must be changed over.

The intermediate position is set by rotating the complete stop cylinders inwards or outwards. The locknut (Pos. 5) must first be loosened and must be tightened again afterwards.

7.4.2 Damping adjustment

The stroke of the shock absorber and thus the damping curve can be matched to the mass moment of inertia occurring in operation by inserting shims under the shock absorber (Pos. 9). The stop sleeve (Pos. 2) with theh shock absorber (Pos. 9) and piston (Pos. 3) must be dismantled first.

7.4.3 Interrogation of intermediate position

For interrogation of the intermediate position, the interrogation set RMNZ-... is available. This interrogation set is identical with the end position interrogation set RMNS-... but contains only one switching cam, proximity switch and connection cable and is mounted on the opposite side.

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8 Repairs

The repair or elimination of defects on our products by the customer may only be carried out with our explicit written agreement. Any failure to adhere to this principle renders invalid our warranty and liability for any resulting warranty or secondary losses.

Following receipt and examination, all linear actuators of series RM can be repaired by SCHUNK.

9 Response to malfunctions

Malfunctions that are caused by defective components may only be remedied by replacement of these components.

Defective components may only be replaced by SCHUNK genuine replacement parts.

Malfunction	Cause	Remedy
Actuator does not rotate	(1) No compressed air (2) Incorrect pneumatic connections	(1) Check compressed air (2) Check pneumatic elements
End position signal not present	(1) Initiator incorrectly set in relation to stop (2) Initiator defective (3) Broken cable	(1) Readjust initiator (2) Replace initiator (3) Replace initiator cable
Actuator impacts on end positions	(1) Damping incorrectly adjusted (2) Shock absorber defective (3) Ventilation valve defective (4) Rotation speed too high	(1) Adjust stop screw (2) Change shock absorber (3) Check ventilation valve (4) Set ventilation valve
Service load vibrates in end position	(1) Rotation speed too high (2) Inadequate damping (3) Unfavourable installation (4) Unfavourable RM type	(1) Set ventilation valve (2) Optimise damper stroke (3) Check design (4) Use larger RM type

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10 Maintenance and Care

⚠ **Under no circumstances may rotary actuators be operated with oiled air if they are subsequently to be operated with oil-free air.**

- The integral cylinders are lubricated for life and do not require relubrication. Operation with oiled or oil-free compressed air is permissible without restrictions.
- The bearing arrangements of the turntable and of the toothed rack pinion unit are already lubricated. It is not therefore necessary to lubricate these again before operation. Lubrication or relubrication of the toothed rack pinion unit with rolling bearing grease is recommended after approx. 4 million cycles.
- All rotary actuators of series RM are maintenance-free. In order to achieve the maximum operating life, this chapter and chapter 6.2 (at page 6) of this user manual should be observed.
- Apart from normal cleaning of machines, no further maintenance measures are necessary.

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11 Replacement parts

As standardised wear part sets, seal sets are available. The scope of delivery includes all seals.

Ordering numbers of seal sets:

- RMDI 12 for rotary actuator RM 12
- RMDI 15 for rotary actuator RM 15
- RMDI 21 for rotary actuator RM 21

In accordance with the section drawing below, all other wear parts and individual parts are available as single items.

Ordering numbers are as indicated in the following example

- Part No. 1 RM 15-01 (for rotary actuator RM 15)

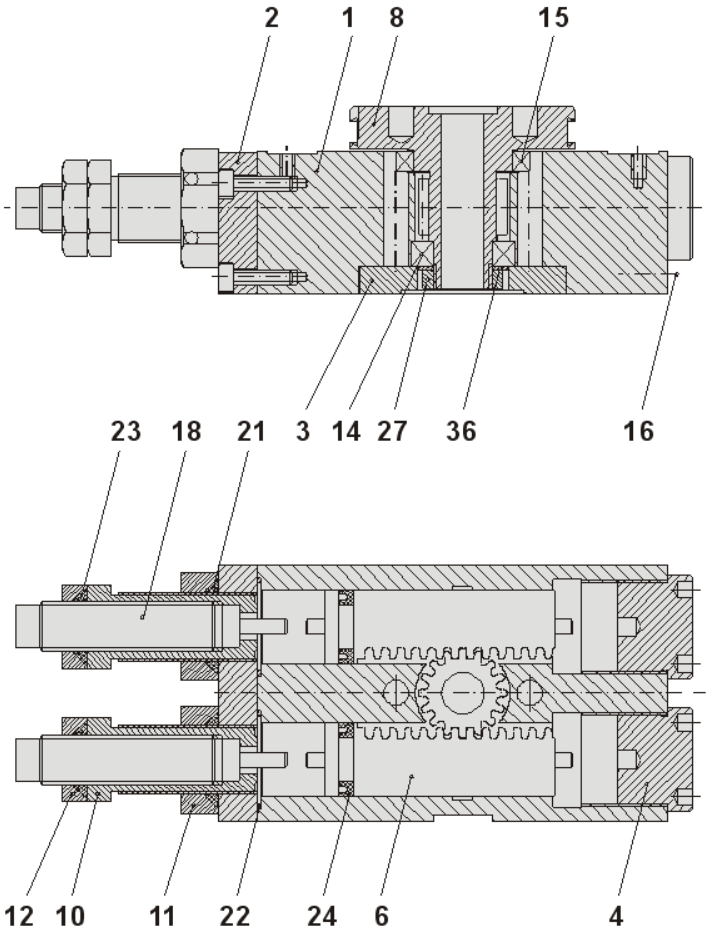

Figure 4: section drawing RM

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12 EC declaration of incorporation

In terms of the EC Machinery Directive 2006/42/EC, annex II B

Manufacturer/ distributor

SCHUNK GmbH & Co. KG.
Spann- und Greiftechnik
Bahnhofstr. 106 – 134
74348 Lauffen/Neckar, Germany

We hereby declare that the following product:

Product designation:	Rotary modules pneumatic, swivel unit
Type designation:	RM 12…RM21
ID number:	0313000…0313015

meets the applicable basic requirements of the Directive **Machinery (2006/42/EC)**.

The incomplete machine may not be put into operation until conformity of the machine into which the incomplete machine is to be installed with the provisions of the Machinery Directive (2006/42/EC) is confirmed.

Applied harmonized standards, especially:

EN ISO 12100-1	Safety of machines - Basic concepts, general principles for design -- Part 1: Basic terminology, methodology
EN ISO 12100-2	Safety of machines - Basic concepts, general principles for design -- Part 2: Technical principles

The manufacturer agrees to forward on demand the special technical documents for the incomplete machine to state offices.

The special technical documents according to Annex VII, Part B, belonging to the incomplete machine have been created.

Person responsible for documentation: Mr. Michael Eckert, Tel.: +49(0)7133/103-2204

Location, date/signature:

Lauffen, Germany,
January 2011

p.p.

Title of the signatory

Director for Development

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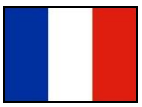

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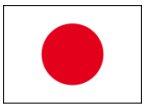

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